IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES.

REPORT

ON THE

AGRICULTURAL DEPARTMENT, ST. LUCIA,

1921.

IMPERIAL BUREAU
13 NOV. 1922
OF MYCO

BARBADOS.
ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE
FOR THE WEST INDIES.

1922.

[Price Sixpence.]

REPORTS

ON THE

BOTANIC STATION, ECONOMIC PLOTS, AND AGRICULTURAL EDUCATION, ST. LUCIA.

Annual Reports on Certain Economic Experiments conducted in connexion with the Botanic Station, 1900-2.

Annual Reports on the Botanic Station for the years 1901 and 1902.

Annual Reports on the Botanic Station, Economic Experiments, and Agricultural Education for the years 1902-3 to 1918-20.

IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES.

REPORT

ON THE

AGRICULTURAL DEPARTMENT,

ST. LUCIA,

1921.

BARBADOS.
ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE
FOR THE WEST INDIES.

1922

[Price Sixpence.]

IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES

REPORT

ON THE

AGRICULTURAL DEPARTMENT

ST LUCIA

1921.

[Price Sixpence.]

LETTER OF TRANSMITTAL.

Commissioner of Agriculture—to Administrator, St. Lucia.

Barbados,

August 28, 1922.

Sir,

I have the honour to forward the Report on the Agricultural Department, St. Lucia for the year 1921.

2. This Report contains a large amount of interesting and useful information: the notes on wind-belts and tree-planting in connexion with Reunion and the efforts to deal with plant pests and diseases are worthy of note.

3. Much of the original information in the report, derived from investigational work, is due to Mr. S. F. Ashby B.Sc., Mycologist of the Imperial Department of Agriculture. The attention he gave during the year to biological matters connected with lime juice and rum will be seen in the Report.

4. The unsatisfactory condition of the Agricultural Credit Societies is to be regretted; but there is nothing to indicate that this was due to any relaxation of effort on the part of the Agricultural Department.

5. Since this Report is the final one prepared by Mr. A. J. Brooks, the Agricultural Superintendent, on his departure from the Colony to a higher post, it may be appropriate to place on record in this letter my appreciation of his long and successful services in the interests of agriculture in the Colony.

I have, etc.

FRANCIS WATTS,

Commissioner of Agriculture
for the West Indies.

STAFF OF THE AGRICULTURAL DEPARTMENT, ST. LUCIA.

A. J. Brooks, F.L.S., F.C.S., F.R.H.S.	...	Agricultural Superintendent, and Land Officer.
E. Buckmire ...	...	Agricultural Assistant.
R. W. Niles ...	...	Overseer and Agricultural Officer. Inspector Agricultural Credit Societies.
E. D. Smith ...	...	Foreman and Agricultural Instructor, Réunion.
A. Pilgrim ...	...	Manager, Government Lime Juice Factory.
M. George ...	...	Junior Agricultural Assistant.
W. W. Arno ...	...	Clerk to Agricultural Superintendent.
A. M. Y. Warrican ...	...	Clerk, Government Lime Juice Factory.

CONTENTS.

	Page.
Work in the Gardens and Observations on Plants	1
Reunion Agricultural and Botanic Station	1
Plant and Seed Importation—Wind Belts and Tree-planting—Experiment Plots—Distribution of Plants	
Union Estate	5
Pests and Diseases	6
Progress in Chief Industries	9
Sugar—Limes—Coconuts	
Progress in Minor Industries	11
Agricultural Instruction	12
Work in Country Districts	16
Agricultural Credit Societies	18
Extension of Interest in Agriculture	23
Special Investigations with lime juice—protozoa in soils	
Administration	28
Meteorological Returns	30

REPORT ON THE AGRICULTURAL DEPARTMENT

ST. LUCIA,

For the Year ended December 31, 1921.

WORK IN THE GARDENS AND OBSERVATIONS ON PLANTS.

The nurseries, plant collections and grounds were maintained in good order throughout the year.

Owing to the general financial depression the money voted for the improvement of the Castries Gardens during the year was not used. The work in connexion with the raising of the lower lawns, was proceeded with as far as funds would permit.

The palm collection planted a few years ago along the southern boundary has made satisfactory progress and has beautified this section of the Gardens.

REUNION AGRICULTURAL AND BOTANIC STATION.

PLANT AND SEED IMPORTATION.

The following interesting economic and decorative plants have been introduced during the year:—

San Ramon coconuts, *Eucalyptus alba, Cocos Plumosa, Hyophorbe Verschaffettii, Dictyosperma rubrum, Tecoma serratifolia,* Coconut varieties: yellow, red and green (from F. M. S.); *Argemone hispida, Averrhoa Bilimbi,* Guava seed (Cayenne), Tea seed (Ceylon).

Another attempt was made to raise plants of *Taraktogenos Kurzii* from which is obtained Chaulmoogra oil used in the treatment of leprosy. Seeds were obtained from India, but again failed to germinate.

Original Condition of the Station.

When the St. Lucia Agricultural Department took over Réunion in June 1913 for the establishment of the Agricultural and Botanic Station, it was an abandoned windswept canefield. Almost every tree and shrub had been exterminated in the process of growing cane.

The site which is situated on a plateau some two hundred feet above sea-level was windswept to such a degree that every plant when first set out in the field had to be artificially protected.

High Wind-Belts.

Under such conditions careful consideration had to be given to the question of of selecting suitable plants for the establishment of permanent wind-belts.

This was successfully done by using such trees as White Cedar, Eucalyptus. Gliricidia, Mango, Casurina and Bamboo. All these plants gave excellent results,

and thick belts from six hundred to a thousand feet long, and twenty-five to thirty feet high are now to be seen in various sections of the Station.

Low Wind-belts.

In addition to these high wind-belts which are planted about six hundred feet apart, it was necessary to provide a system of low belts. For this purpose the following plants have proved successful:—Angelica, Acalypha, Gliricidia, Calliandra, Governor plum, *Lagerstroemia indica*, Pithecolobium, *Thyrsanolaena agrostis*, *Bougainvillaea glabra* and Dwarf Bamboo. Over a mile of neatly trimmed hedges of these plants, varying from five to seven feet in height has been effectively established.

Economic Plant Collection.

In view of the fact that eight years have elapsed since the opening of this Station, it may serve a useful purpose to record here some of the more important economic plants have been introduced and successfully established, together with brief notes indicating their various uses.

From the following it will be seen that a valuable plant collection has been got together and which being added to year by year, should prove a valuable asset to the Colony.

Tree Planting.

One of the most important features of the work at the Station has been the planting of trees, and there are now over a thousand trees permanently established. Among them are the following:—

'Beefwood' of Australia (*Casurina equistifolia*). Two hundred and fifty trees of this valuable hardwood have been established, and many have already reached a height of 23 feet, with a trunk circumference of 34 inches. It is one of the most important treesfor fuel; its capacity for raising steam is equalled by no other timber. For this reasor alone it should be planted freely about the island. The wood is hard and durable, being suitable for fencing, gates and shingles. The bark of this tree is astringent and useful in chronic diarrhoea and dysentery.

French Oak or Yoke Wood (*Catalpa longissima*). This tree is said to produce the best and most useful timber grown in Jamaica. It is very durable, and yet, not too hard for general use, being easily sawn into planks, boards or scantling.

British Honduras Mahogany (*Swietenia macrophylla*). Planted out in 1916 these plants have attained a height of 20 feet with a trunk girth of 19 inches. During the first three years a twig borer (*Hypsipyla grandella* Zell.) proved very troublesome and considerably retarded their growth. The timber produced by this tree is of greater commercial value than the West Indian species. At present it is a very rare plant in this island but it is hoped that planters will assist in establishing it throughout the Colony.

West Indian Mahogany (*S. Mahagoni*). Several fine specimens of this timber tree are to be seen growing in the Station.

West Indian Boxwood (*Tabebuia penitaphylla*). This valuable timber tree has made remarkable development under Réunion conditions. A specimen planted out in 1916 has attained a height of 30 feet with a lateral spread of 25 feet and a trunk girth of 6 ft. 10 ins. The wood of this tree is exported in considerable quantities from Maracaibo to the United States. It is also one of the finest flowering trees known to the tropics.

Lignum-Vitae (*Guaicum officinale*). The wood is exceedingly hard and tough, and is useful for blocks of pulleys, croquet mallets, skittle balls etc.

Pencil Cedar (*Juniperus barbadensis*). A large number of these trees were planted out in 1914, and have done remarkably well. Their average height at present is 14 feet with a lateral spread of 12 to 15 feet and a trunk girth of 2 to 3 feet.

Each plant is in a vigorous condition and remains perfectly green throughout the most prolonged droughts. This species is therefore a valuable tree for planting on the drier exposed regions of the leeward coast. The wood of this tree is used in the manufacture of cedar pencils, and is one of the most beautiful of our ornamental woods. Door-pannelings and ceilings made of this wood are said to be unsurpassed for beauty and the wood has a pleasing odour.

Bermuda Cedar (*J. Bermudiana*). Plants of this species have also done well and attained a height of 12 feet with a spread of 10 feet, their girth varying from 14 to 20 inches. It produces a timber with beautiful graining and is used for cabinet work, furniture, interior ornamental house work. The wood is light and fragrant.

Juniperus pachyphloea. The silvery foliage of this species makes it one of the most striking plants grown at the Station. On a moonlight night it closely resembles a tree covered with hoar frost.

Teak (*Tectona grandis*) A tree of India and Burmah which yields a valuable of great strength and durability. Largely used in ship-building.

Carib wood (*Sabinea carinalis*). A small tree used for posts. It produces an abundant of blood-red flowers.

Fustic (*Chlorophora tinctoria*). One if the best timber trees for hubs and felloes of wheels. The wood is hard and tough and of a bright canary-yellow colour. It is suitable for panels, furniture and cabinet work.

Caconier (*Ormosia dasycarpa*). The wood of this tree is useful for all kinds of house work such as rafters or posts or any other construction work. It stands salt water well and makes good piles. Shingles made from this timber are said to equal Wallaba.

Other trees include:—

Logwood (*Haematoxylon campechianum*), introduced from British Honduras; Candleberry tree (*Aleurites triloba*); Bread tree *Elaocarpus Ganitrus*); Akee (*Blighia sapida*); Balsam of Copaiba (*Copaifera officinalis*); Camphor tree (*Cinenamomum Camphora*); Ilang-llang (*Cananga odorata*); Cinnnamon (*Cinnamomum Zeylanicum*); Kuteera gum tree (*Cochlospermum Gossypium*); Divi-divi (*Caesalpinia coriaria*); Coca plant (*Erythroxylon Coca*); Silk cotton or Kapok (*Eriodendron anfractuosum*); Indian Mulberry (*Morinda citrifolia*); Panama candle tree (*Parmentera cerifera*); White mulberry (*Morus alba*) *Zizyphus Spina-Christi*; *Quebrachia Lorentzii* (Tannin extract).

Notes on Plots at the Botanic and Experiment Station, Reunion.

SUGAR-CANE. The total area devoted to cane cultivation during the year was ten acres. The chief varieties being Ba 6032, B.H.10(12), B. 6450, B. 147 B. 208 and Bourbon.

COCONUTS. These plots have made excellent progress and bearing is now becoming general. A number of plants have been raised from the dwarf varieties received from the Malay States through Kew and will be planted out into permanent positions in the near future.

LIMES. Both varieties—Spineless and Ordinary—continue to thrive well under the existing conditions, and produce heavy crops. Scales have been kept in check with Whale oil soap and kerosine emulsion.

CITRUS. This plot contains, grape-fruit, lemon, citron, Portugal and Mandarin oranges as well as several more important commercial varieties. Heavy crops of fruit are now being produced.

MANGOES. Of all the varieties tried, the Julie remains the best cropper under these dry conditions and is not troubled with black blight.

PINE-APPLES. The soil and conditions at this station are particularly suited, to this cultivation and large well-shaped fruits are obtained.

PARA RUBBER. As would be expected, the conditions are somewhat on the dry side for this plant, but the trees have made good growth.

BAY TREES (*Pimenta acris*). This plot contains plants received from Trinidad, Dominica and Montserrat and are being grown side by side with local wild plants. There is a marked difference in these varieties, and it is possible that their oil content will be found to vary also. The whole of this district is suitable for the cultivation.

CAMPHORA. This is also another crop which promises well for this particular district. The plants have made good development and distillation experiments could not be conducted.

CASSAVA. About five acres devoted to this crop during the year, from which starch was obtained, and farine made for local consumption.

SWEET POTATOES. Maize and Guinea corn were grown as intermediate crops throughout the year.

Seedling Canes.

This Colony has in the past depended entirely upon the work of the Agricultural Departments of Barbados and Demerara for its supply of new sugar-cane varieties. Now that the importation of all sugar-cane varieties from without the Colony has been prohibited, it is necessary that this department should devote special attention to the work of raising new seedling canes if the future of the local sugar industry is to be safeguarded.

Owing to the canes arrowing late, a start could not be made before the end of November. During December a good quantity of fertile seed was obtained from which a large number of promising seedlings have been raised.

Six hundred strong seedlings have been potted and are making vigorous growth. These are to be planted out in the trial grounds at Réunion during April

WORK IN THE NURSERIES AND DISTRIBUTION OF PLANTS.

The following table shows the plants, cuttings and seeds distributed during the year :—

Plant Distribution.

Plants	Year 1921.
Limes	9,056
Cacao	92
Oranges (budded)	19
Mangoes (grafted)	69
Coffea robusta	247
Coffea Liberian	6
Grapefruit	44
Economic and decorative cuttings	393
Cassava	600
Sweet potato	40,000
Sugar-cane	2,550
Economic and Decorative plants	898
Dolichos hosei	200
Total plants	54,174

PLANT DISTRIBUTION.—*continued.*

Seeds.

Maize	2	pkts.
Ornamental	2	„
Vegetable seeds	236	„
Onion „	1	„
Horse beans	21	lb.
Onion sets	700	„
Nutmeg	200	„

The following observations made by the Mycologist on the staff of the Imperial Department of Agriculture who visited Réunion in July are taken from his official report:—

'The Botanic and Experiment Station at Réunion near Choiseul was visited. It is evident that by adopting right methods from the outset Mr. Brooks has made a marked success of this venture. Wind-breaks, live and dead mulch, and judicious rotation, cultivation and drainage have transformed this site on the light soil and in a dry district in a remarkable way so that it constitutes an admirable object lesson. The lime nursery has been of much service and starting from very small beginnings a nursery containing many of the best Barbados and Demerara cane seedlings has been worked up and large quantities of cuttings supplied to the sugar estates which are now mainly planted in seedlings. A high grade syrup has been made at the Reunion factory without employing soured juice.'

UNION.

CANE CULTIVATION.

In August 1920 when the sugar market was abnormally high, the Government decided to plant up the available lands at Union in sugar-cane and vegetables.

Owing to the existing conditions—poor and expensive labour supply, constant flooding of the Union river, and the heaviness of the soil, the work proceeded slowly. Weeds such as Johnson grass which had during the abandonment of this Station by the Agricultural Department, became thoroughly established proved very troublesome and expensive to control.

About 20 acres of cane have now been established but as no milling facilities are available at Union, it is hoped that the crop may be profitably disposed of to neighbouring proprietors.

Mr. Ashby, Mycologist, Imperial Department of Agriculture, visited Union with the Agricultural Superintendent and was good enough to give an independent opinion on this estate as follows:—

'The experimental farm at Union near Castries was visited also. Stiff soil, heavy rainfall, recurrent severe flooding and a high expenditure for weed control and trenching are the salient features of this estate. Many acres have been cleared and planted in canes recently, but as there is no equipment for grinding, the canes will apparently have to go to a local factory or be transported four miles by road to Castries and then by water to one of the West coast factories so that the outlook for a remunerative return is not very promising.'

WORK CONNECTED WITH INSECT AND FUNGUS PESTS AND THEIR CONTROL.

The Plants Protection Ordinance requires that all importation of seeds and plants shall be delivered up to the Agricultural Department upon arrival for inspection, and treatment if necessary.

PROCLAMATIONS IN FORCE UNDER THIS ORDINANCE.

The Government has the power to prohibit the importation of any particular plant from any country where a dangerous disease in connexion with that plant

Such a course has been taken in regard to:—

COCONUTS.

(1) Coconuts, coconut plants or any part thereof that may have come directly or indirectly from Trinidad, Tobago, Jamaica, Cuba, or any part of Central or South America.

Object: To prevent the introduction of a virulent form of the dreaded disease known as 'Budrot' of coconuts (see *Official Gazette*, October 29, 1910).

(2) Coconuts, coconut plants or parts thereof that may have come directly or indirectly from Grenada.

Object: To prevent the introduction of a serious disease of coconut trees recently discovered in Trinidad and Grenada and known as the 'Red Ring Disease', of coconuts. (See *Official Gazette*, March 1, 1919).

BANANAS.

(3) Banana plants or any parts thereof that may have come directly or indirectly from Trinidad, Tobago, or any part of Central or South America.

Object: To prevent the introduction of 'Panama Disease' (see *Official Gazette* October 29 1910).

CACAO

(4) Cacao plants from South America.

Object: To prevent the introduction of the 'Witch Broom' disease (see *Official Gazette*, April 4, 1902).

CITRUS. (Orange, Grapefruit, Limes, etc.)

(5) All Citrus plants from the United States of America, Cuba, Porto Rico, Jamaica, Hayti or San Domingo.

Object: To prevent the introduction of 'Citrus Canker' disease (see *Official Gazette*, September 23, 1916.)

(6) All Citrus plants or any parts thereof from British Guiana, Trinidad and Greater Antilles.

Object: To prevent the introduction of a serious disease of lime trees known as 'Blossom Blight' and 'Wither Tip' disease, caused by a fungus *Gloeo-sporium Limetticolum* Clausen. (see *Official Gazette*, March 1, 1919.)

(7) Citrus, Coffee, Mango, Gauva, Sapodilla, and Star Apple plants from Bahama Islands, Ceylon, Cuba, India, Jamaica and Philippine Islands.

Object: To prevent introduction of 'Spiny Citrus White Fly' (see *Official Gazette*, February 10, 1917).

(8) No rooted plant in earth may be imported from any of the places mentioned in (5) and (7) unless they are accompanied by a certificate from the proper authority in the country in question certifying that citrus canker does not exist in the district from which the plants are taken, and that the disease has not existed there for a period of not less than two years previously. Persons ordering plants from any of these places should instruct the firm from whom they are being purchased to obtain and forward the necessary certificate with the plants.

COTTON.

(9) Cotton seed or seed-cotton from any country or place other than the colonies of Grenada or St. Vincent.

Object: To prevent the introduction of 'Pink Boll Worm' and other pests and diseases of cotton. (See *Official Gazette*, July 30, 1917).

SUGAR-CANE, ETC.

(10) Sugar-cane plants, cuttings or any parts thereof or any grass, fodder, or seeds of grasses and sorghum that may have come either directly or indirectly from any place beyond the limits of this Colony.

This includes such plants, as rice, bamboo, rye, barley, oats, maize, millet, guinea corn, Job's teas and all grasses and sugar-cane.

Object: To prevent the introduction of the 'froghopper' and Mosaic, Mottling or Yellow Stripe disease of sugar-cane. (See *Official Gazette*, April 2, 1921).

Efforts made to Eradicate and Prevent the Spread of Plant Diseases and Pests within the Colony.

The Plants Protection Ordinance referred to above also gives authority to the Agricultural Officers to compel owners of land upon which certain disease or pests are found to have them destroyed.

Under this section a few cases of Budrot disease of coco-nut, and Love Line infestation were effectively treated. One case of irregular important of sugar-cane cuttings was discovered, and the plants were promptly destroyed.

Importation of Bees.

Under Ordinance No. 18, it is unlawful to import into this Colony any queen-bee which is not accompanied by a certificate approved by the Agricultural Superintendent that the disease known as Foul Brood does not exist in the apiary rom which the queen-bee was taken; or any bee-hive or part of a bee-hive or any article whatsoever which has been used in connexion with bees or any bees other than queen-bees as aforesaid.

Anthrax.

Under Ordinance No. 17 the Governor in Council may from time to time by Notice in the *Official Gazette* prohibit the importation directly or indirectly from any Country or place named in such Notice of any animal, carcase, fodder or litter which is likely to be a means of introducing any disease into this Colony.

Plant Inspection and Fumigation.

Thirty-seven consignments of plants and seeds were received for inspection and disinfection or fumigation, if neceessary.

Ten of these consignments having been imported contrary to proclamations issued under the Plants Protection Ordinance were destroyed by fire. They consisted of sugar-cane from St. Vincent and Barbados.

PANAMA DISEASE OF BANANAS.

Mr. S. F. Ashby, Mycologist on the staff of the Imperial Department of Agriculture visited the Colony from July 8 to 19, and reported as follows in connexion with Banana disease:—

'The visit arranged with the Superintendent of Agriculture on my own initiative mainly for the purpose of:—

'Establishing definitely, by inspection in the field, the nature of a banana disease which has received the attention of the Department since 1911.

'Inspecting coconut cultivations with a view to determining the identity of any diseases found to be present.'

BANANA DISEASE.

'This disease was described by the then mycologist in his report of May 13 1912 as No. 1 Disease. It was the subject of considerable correspondence in 1911 and 1912, and again in 1918 and 1920, but no definite conclusions were arrived at in regard to its identity. It was referred to again in a memorandum by Mr. Buckmire, Agricultural Instructor, attached to Items of Departmental Interest for March this year. Tubes of culture medium were sent to the Superintendent and in due course these were returned, after being inoculated with internal tissue from an affected Gros Michel plant at Guesneau Estate by Mr. Niles, Agricultural Instructor. From these tubes a fungus was obtained in pure culture which proved to be indentical with *Fusarium cubense* E. F. S. and Brandes the cause of Panama disease on Banana Wilt. It was thought desirable to see the disease in the field before pronouncing definitely as to its nature.'

'Guesneau Estate was visited on the July 12, in company with the Agricultura Superintendent and Mr. Niles, and Gros Michel plants were seen affected by the disease. Samples were collected and culture media inoculated with the result that the same species of Fusarium developed. The diseased plants showed both external and internal symptoms characteristic of Panama Disease as observed by me in Jamaica and as described by investigators elsewhere.

'The No. 1. Disease of F. W. South may therefore be stated definitely to be Panama Disease or Banana Wilt.

'The disease was present at Guesneau and the Forestiere district, Union and Gros Islet in 1911, and therefore, in all probability throughout the north western districts but not in the Soufriére or southern districts. This would appear to be its present distribution as neither Mr. Brooks nor Mr. Niles have seen it around Soufriere, Choiseul and other parts of the south.

'Panama Disease also attacks Carata or Lady's Finger in St Lucia and Mr Niles believes it was responsible for a disease in the Governor or Canary banana in section 5 at Union in 1912. A part of section 9 at Union on which Gros Mitche was badly diseased in 1912 has been recently replanted in Gros Michael and Governor, so that should infection have been retained in the soil, disease may be expected to reappear on the large variety and the behaviour of the 'dwarfs' can be watched.

'Gros Michel fruit is, and has been for many years shipped from St. Lucia to Barbados and although Panana Disease has been present in St Lucia for at least ten years it is not known to occur in Barbados. Most, if not all, of the Gros Michel fruit shipped from Castries appears to be brought up the coast from Canaries, Soufriere etc. where disease has not been detected, and this, together with the fact that the fruit is carried 'naked' (not bedded or packed in banana trash) probably accounts for the non-transmission of disease to Barbados. Fruit from diseased trees would not in any case be shipped as it is unmarketable.

'If, however, banana trash is sometimes brought over in shipments of fruit

from St. Lucia it would be well to warn the receivers in Barbados that it might carry infection so that it could be destroyed at the wharf and not find its way into cultivations for mulching.

'The cultivation of Gros Michel has been largely abandoned in the districts near Castries, so that unless there is a tendency to take up the cultivation again in the north-western districts, there does not appear to be any call for special measures except perhaps to forbid the movement of suckers from that area into the south-western and southern districts. Such movement would be mainly by water and is unlikely, and at any rate it is now rather late in the day to impose restrictions.

COCONUTS.

'Cultivations were inspected in the Gros Islet, Choiseul and Vieux Forte districts and at other points in a more cursory way. Trees of all ages appear to be very free from diseases. No cases of Budrot, Red Ring, and Little Leaf were seen. At one estate on the South coast there is an extensive belt of young bearing trees on good land by the sea. Unfortunately they had been planted too close (20 × 20 feet) The new owners have had the courage to cut out about 6000 trees and there can be little doubt that this action will be amply repaid later. On the light soil near Choiseul considerable plantings appear to be coming on fairly well in spite of dry weather. As it is proposed by the owner to plant up extensive areas in the same district on similar soil at an early date, experiments started now in manurings and cultivation on the sections already planted are likely to provide valuable hints for future management. Mr. Brooks has the consent of the owner to a trial of the species of Dolichos which has done well at Réunion as a cover crop.

'In 1918 several trees died at an east coast estate from a budrot.. The Mycologist found a fungus present in specimens of the rotted tissue sent to him suggestive of the Phytophthora causing an infectious budrot in Jamaica and India Unfortunately heavy rain caused the proposed visit to this district to be abandoned, but it is hoped that the Superintendent may arrange to have the coconuts at this estate inspected and submit material from diseased trees, if any are, found for examination.

CACAO.

'At an estate near Soufriere some of the spots where cacao had been killed by Rosellinia were pointed out. Limes planted in some of these places were also dying out from the same cause. The owner has planted a number of the spots in canes and coconuts. Although isolation trenches have stayed the outward extension of disease from definite centres, new independent centres appear from time to time.

LIMES.

'The disastrous effects of planting limes close in imitation of the method appropriate for cacao were seen in the Soufriere district'.

PROGRESS IN THE CHIEF INDUSTRIES.

Sugar.

The year under review has proved, in so far as the local sugar industry is concerned, to be the most disastrous since the collapse of the sugar market some twenty-five years ago.

This collapse, as so often happens, was preceeded by abnormally high prices, and this led to much financial speculation locally. The result being that when the crash came, local speculators who had purchased sugar properties during the high prices found themselves saddled with obligations which proved very difficult to meet. This necessitated a considerable reduction in expenditure and led to the closing of some of the factories for long periods.

Tempted by the high prices ruling the previous year, many of the smaller estate owners were encouraged to raise loans to enable them to import and erect mills and small factories. They have been hard hit by the general collapse of the sugar and syrup market and much sympathy is felt for them in their present difficulties.

The following figures show the value and quantities of sugar products exported during the last two years:—

		1920	Value £	1921	Value £
Usine sugar	(tons)	3,738	141,126	2,972	76,937
Muscovado sugar	„	288	5,190	266	3,884
Molasses & syrup	(gallons)	199,366	28,160	100,712	5,203
		Total	£174,476		£86,034

The quantity of rum made at the local distilleries was as follows:—

1920.	51,597	proof gallons valued at	...	£9,039
1921.	51,385	„ „ „ „	...	10,277

Cacao.

The cacao market has been in a very depressed state throughout the year and sales have been difficult and at time impossible.

During 1920 cacao prices reached as high as 128/- per cwt. and then fell rapidly to 45/-, sales being made in June 1921 at 40/- per cwt., London prices.

The exports of cacao during 1920 and 1921 were as follows:

1920: 8,966 cwt. valued at £43,944
1921: 12,364 „ „ „ £25,212.

A shipment of 2,699 cwt. was made early in January 1922, and although belonging to the 1921 crop, does not appear in the exports for 1921.

Limes.

Lime products of the total value of £14,064 were exported during the year.

The actual steady development of this industry is shown by the following figures: Total lime crop of the island calculated in barrels of fruit:—

1914:	12,765	barrels	1918:	45,223	barrels
1915:	21,363	„	1919:	42,537	„
1916:	22,489	„	1920:	42,508	„
1917:	18,180	„	1921:	45,975	„

Coconuts.

The coconut plantations are being extended each year and new areas are coming into bearing.

The exports were as follows:

	Quantity.		Value. £
1920.	Coconuts	301,272	2,114
„	Copra	169 cwt.	292
1921.	Coconuts	171,660	900
„	Copra	33,479 lb.	419

PROGRESS IN MINOR INDUSTRIES.

BAY OIL.

There are now three bay oil distilleries operating in this Colony, two in the Dennery district and one in Castries.

The actual export of bay oil during the year is considerably below the average for the last few years.

Bay rum is being successfully manufactured locally for the first time and will soon appear on the list of exports.

This industry should receive every possible encouragement for the following reasons. The bay leaves are gathered by peasants in the various districts throughout the island. This enables them to obtain ready money with which to purchase imported articles of clothing and diet. The leaves being distilled locally entails the employment of a fair amount of labour in handling and drying.

The rum used in the manufacture of bay rnm is also a local product, and if an extensive bay rum industry can be built up it will be of material gain also to the local rum industry.

The export of Bay oil during the year was 360 gallons valued at £137.

BEE-KEEPING.

This industry which has been so profitable during the past few years suffered a heavy decline. The export figures show that only 29,526 lb of honey were shipped as against 61,086 for the year previous.

This decline does not represent a falling off in actual production, but is due to the considerable drop in price. Many producers find it more profitable to sell at low figures for local consumption rather than pay the high freights and charges now that the London market price has fallen to 35/- per cwt.

COTTON.

Cotton continues to receive some slight attention by a few persons and 5,599 lb. of Sea Island Cotton was exported during the year.

EXPORTS FROM ST. LUCIA, 1921.

	Quantity	Values
Sugar Products		
Sugar, vacuum pan	2,972 tons	£ 76,937
„ muscovado	266 „	3,844
Molasses & Syrup	100,712 galls	5,203
Rum	...	...
Cacao products :—		
Cacao	12,364 $\frac{22}{112}$ cwt.	25,212
Lime products :—		
Concentrated juice	35,108 galls	9,789
Raw juice	813 „	41
Distilled lime oil & Essential oil of limes	1,133 „	2,457
Green limes	1,858 brls.	1,777
Coconut Products :—		
Coconuts	171 660 (No.)	900
Copra	33,479 lb	419

(EXPORTS FROM ST. LUCIA, 1921.—*Continued.*)

	Quantity.	
Honey Products:—		
Honey	29,526 lb	463
Beeswax	120 „	7
Cotton Products:—		
Sea Island lint	5,599 lb	624
Cotton seed	12,607 „	44
Spices:—		
Nutmegs	4,520 lb	87
Mace	533 „	21
Vanilla	912 „	32
Various Products:—		
Oranges	209,364 (No.)	243
Mangoes		1,991
Cassia Fistula	1,550 lb	9
Kola	11,660 „	150
Bananas	2,616 bunches	291
Bay oil	360 galls.	737
Hides	535 pieces	114
Plantains	3 bunches	9*s.*
Arrowroot	...	...
Farine	808 lb	519
Yams	...	...
Fish oil	...	. .
Forest Products:—		
Logwood	70 tons	245
Firewood	32,238 „	1,991
Railway Sleepers	4,794 Cu. ft.	356
Brooms (made from palm leaves) ...	1,368 doz.	61
Posts	904 Cu. ft.	82
Cedar	488 „	39
Boards	22,452 ft.	147
Hoe sticks	364 Cu. ft	20
Dye wood	...	...
Spokes	463 Cu. ft.	53
Charcoal	514,615 lb	1,405
Felloes	133 Cu. ft.	17
Ladle handles	...	...
Shingles	30,825 (No.)	20

AGRICULTURAL INSTRUCTION IN THE PRIMARY SCHOOLS.

REPORT OF THE AGRICULTURAL SUPERINTENDENT ON THE TEACHING OF AGRICULTURE IN THE PRIMARY SCHOOLS OF ST. LUCIA DURING 1921.

The thirteenth annual examination of Primary Schools in Agriculture was conducted by the Agricultural Officer between November 23, and December 16, 1921.

Sixteen schools were examined. La Croix Maingot has ceased to do agricultural work for the present as a female teacher is now in charge.

The pupils present on examination day represent 73 per cent. of the children taught in the Agricultural Classes.

The standard of work done was high, and the arrangement of the practical

task in most cases was made interesting for the boys. Grafting of economic plants is on a very satisfactory footing. Budding is only satisfactory at a few schools. Propagation of the lime, mango and many other plants have been carried out by circumposition. Patch budding has only been done in two schools. This should be taught generally.

Remodelling of the gardens should receive more attention. Many teachers seem afraid to touch the forms of the beds after they have been once made.

The growing of a few holes of the best varieties of canes is serving a useful purpose in some of the gardens. Before vacation empty plots should be sown in cow peas instead of being left for weeds to develop.

Examiner's Report.

(Submitted by the Agricultural Officer, Mr. R. Niles.)

CASTRIES R. C. BOYS. The theoretical knowledge at this School was good.

The practical demonstrations were well arranged and worked out, and were quite sufficient to illustrate the lessons taught in class. Grafting was satisfactory, but although a few buds have been successfully put in from time to time, this requires proper attention. The garden beds should receive liberal applications of pen manure, before they are made. More details should be entered in the garden note book.

SOUFRIERE R. C. BOYS. The practical work and demonstrations have shown improvement, but more simple experiments should be included in next year's work. Budding and grafting (especially the former) should receive more attention, and the results of these operations entered in the garden note book. The theoretical knowledge was good.

VIEUX FORT R. C. BOYS. Agriculture on the whole has shown considerable improvement since last examination. Simple experiments with native crops were well arranged and carried out and special attention was given to the growing of a few holes of the best varieties of sugar cane in the island, and as a result, the Agricultural Class was very conversant with these varieties. This is useful particularly as sugar cane is the principal crop grown in that district. The improvement should be maintained.

LABORIE R. C. BOYS. Agriculture was on the whole satisfactory, but the garden was not as clean as usual. The experiments were well arranged and carried out in an efficient manner. The beds of the garden should be heavily manured and reformed before commencing next year's work. The fruit trees should be heavily mulched before the dry weather sets in.

SALTIBUS R. C. JUVENILE. This school garden is in good order and the girls still take great interest in the ornamental plots. The practical demonstrations were well arranged and carried out, grafting is satisfactory, but budding requires more attention. The soil of the garden is poor and should be well manured before the beds are remade.

CHOISEUL R. C. BOYS. The theoretical knowledge of the pupils is satisfactory and the practical work is receiving proper attention. Budding of the orange has been carried out on quite a large scale, but grafting has been neglected, this latter

should be included in next year's work and the plants in the old school garden used for obtaining scions. A proper record should be kept of the buds and grafts put on by the pupils.

ANSE-LA-RAYE R. C. JUVENILE. The school garden here has shown improvement since last examination. The waste lands in front of the school and around the garden proper, have been made use of, and this has greatly improved the general appearance. Budding and grafting have received proper attention, and the propagation of the lime by circumposition has been successfully carried out. The garden is cropped with a variety of useful vegetables, and sugar cane, coffee. and other local crops are being cultivated in plots around the garden.

CANARIES R. C. JUVENILE. The school garden here is not suitable for continuous work and although many attempts have been made, the results of the demonstration work were not on the whole sufficiently successful to illustrate the class work. Arrangements have been made with the Warden to procure a more suitable piece of land before beginning work for next year.

MICOUD R. C. JUVENILE. Agriculture is giving good results at this school. The lime plant propagated by circumposition and planted out in the school yard is doing well. This school is again the first to propagate the mango by circumposition. The garden is very sandy and should receive liberal applications of stable manure and green dressing very often. Attention is paid here to the cultivation of the pea nut, this should be introduced into the other school gardens. Besides. shield budding, patch budding is also practised on a fairly large scale.

MON REPOS R. C. JUVENILE. The condition here is fair but there is a tendency towards falling off in agriculture. The garden requires more tilling, and more simple experiments should be included in the practical work. The soil of this garden is heavy, and will profit largely by frequent applications of stable manure, and green dressing.

DENNERY R .C. BOYS. The theoretical knowledge at this school is good, but more attention is necessary to operations such as budding, grafting, and also to the arrangements of simple experiments in the practical demonstrations.

RESOURCE R. C. JUVENILE. The practical work and condition of the garden show that they have received proper attention. Simple experiments with local crops have been well arranged and carried out, and the Apiary is giving good results. The theoretical knowledge is weak, and this is apparently due to the very bad attendance of the pupils.

CASTRIES ANGLICAN JUVENILE. The high standard of work reported on las year, has been maintained. Propagation of plants by circumposition, budding, grafting, and layering, form a large part of the demonstration work, and the extensive growing of English vegetables is continuously carried out in a very efficient manner. The girls of this school take great interest in the practical work of the garden.

RIVIERE DOREE ANGLICAN JUVENILE. This school garden was cropped with a variety of useful vegetables, and attention has been paid to grafting. Budding is not satisfactory and should be persisted with. The garden note book is well kept.

CASTRIES WESLEYAN JUVENILE. Improvement has been shown in the practical work at this school, and the other branches are satisfactory. Proper attention has been paid to budding and grafting of economic plants, and several grafted 'Julie mango' plants have been distributed during the year under review.

FORESTIERE WESLEYAN. The theoretical knowledge at this school is fair, but the practical work has fallen back considerably. The pupils of the Agricultural Class are small in size, but if a little moore thought is put in the arrangement of the practical work in the garden much better results will be obtained.

LIST OF MARKS AND STANDING OF SCHOOLS IN AGRICULTURAL TEACHING.

	No. of Pupils examined.	Condition & use made of Garden.	Practical work & Knowledge.	Theoretical work	Totals.	Percentage.	Result Note.
Possible Marks.	No.	10	10	10	30	100	
Castries Anglican Juvenile	29	10	10	9	29	96·6	E.
Laborie R. C. Boys'	34	9	10	9	28	93·3	E.
Castries R. C. Boys'	37	8	9	10	27	90	E
Castries Wesleyan Juv.	14	9	9	9	27	90	E.
Micoud R. C. Juv.	15	8	10	9	27	90	E.
Dennery R. C. Boys'	15	8	8	10	26	86·6	V. G.
Anse-la-Raye R. C. Juv.	9	8	9	8	25	83·3	V. G.
Choiseul R. C. Boys'	17	9	9	7	25	83·3	V. G.
Vieux-Fort R. C. Boys'	22	9	8	7	24	80	V. G
Saltibus R. C. Juvenile.	10	8	8	7	23	76·6	V. G.
Mon Repos R. C. Juvenile	7	7	8	8	23	76·6	V. G.
Soufriere R. C. Boys'	53	7	7	9	23	76·6	V. G
La Resource	7	8	9	5	22	73·3	G.
Riviere Doree Anglican	6	8	8	6	22	73·3	G.
Forestiere Wesleyan	6	7	7	7	21	70	G.
Canaries R. C. Juv.	3	5	6	8	19	63·3	G.

Examination of Teachers in Agriculture.

The annual examination in agriculture for Teachers of primary schools was conducted at the Botanic Gardens. Mr. Niles, Agricultural Officer, who was appointed examiner reported as follows:—

RESULTS OF PUPIL TEACHERS' AND CERTIFICATE TEACHERS' EXAMINATION YEAR 1921.

Possible Marks.	50	Possible Marks.	50
Probationers.		*First Year.*	
P. Brown	21	Simon Noel	22
Leon Lesmond	17	G. S. Skeete	14
Ignatius Chubb	7	Egbert Glace	13
Vitalis Tobie	15	Francis Charles	27
Arthur Elwin	17	Harrison Mathurin	2
Whitney E. Mondesir	13	Darius James	18
Anthony Pelius	26	J. B. Joshua	18
Charles Lamontagne	11	*Second Year*	
Maurice Philip	7	Florival Elius	18
Fernal John	20	Peter Joseph	19
Frederick Modeste	13	*Third Year*	
Thomas Rismay	19	A. Charles	35
Frederick Paul	21	Victor C. Regis	30
		Harrison Regis	29
		W. Gregory Jacobs	19

Certificate Teachers.

Possible Marks	50
Leon Louis	28
S. Jno. Cox	21
G. I. Castang	22
Maximus C. Joseph ...	26

LECTURES TO TEACHERS.

The annual course of lectures on the science and art of agriculture was delivered in August by the Agricultural Superintendent to the Head Teachers of the primary schools.

Twenty-five teachers and nine other persons interested in agriculture attended the lectures which dealt with: The study of food substances and their manufacture by plants.—Structure of plants.—Economic uses.—Fungi and their relation to human welfare.—Laying out school gardens.—Propagation of plants.—Pruning cacao.—Budding oranges and Grafting.

Special Lessons to Pupils of the Primary Schools.

Special lessons on agricultural matters were delivered by Mr. R. Niles to the pupils of the various schools throughout the island during the year.

AGRICULTURAL WORK AND INSTRUCTION IN THE COUNTRY DISTRICTS.

The Cacao and Limes Prize Holdings Competition were discontinued owing to the lack of funds to provide prizes.

Visits were paid by the Agricultural Assistant to all the holdings of the last competitors, and he reported as follows:—

Report on the present condition of the Prize Holdings Competition plots for Limes, Cacao and Coconuts in the Districts of Castries and Soufriere.

Lime Competition plots—Castries—The eleven plots on which cultural instructions were followed throughout the two years of the Competition were inspected during December and January 1921-22.

The plots are maintained in very fair condition so far as keeping down weeds and intercropping with provision crops are concerned, but regularity of trees as well as healthy growth and spread are confined more so to the Prize winners plots on which the work carried on during the Competition was more through.

The visit was timely for advising the desirability of regulating the intercrops so that the limes get sufficient room for branching and free development, and encouraging the system of mulching which was practically given up.

For regularity and well-balanced branching trees Mrs. S. Warrican's plot at Vide Bouteille, leads by a long way. Fully 25 per cent of the trees are 9 ft. and over high, some of which have a spread covering a surface area of 56 ss. ft. and have produced small crops of large fruits.

Scale Insects (*Chionaspis Citri, Coccus Viridis, Lepidosaphes beckii*) are generally met and in a few instances are responsible for the vacancies met. Wherever the above scale insects are met the parasitic fungi (*Sphaerostilbe coccphila, Ophionectria coccicola* and *Myriangium Duriaei*) were also present. In damp situations the insects are kept fairly well under control, but where conditions are not quite favourable for the spread of the fungus and the soil is poor or insufficiently tilled the scale insects make headway.

Lime Competition plots, Soufriere—The two plots (one of Isidore Alcindor, (now deceased) Anse Mahaut, and the other of Fevrius Fevrier, Fonds St. Jacques, are simply kept up on account of the provision crops interplanted with the limes. In the former the lime plants which are still alive are thriving indifferently owing to soil conditions and inattention, but in the latter although the limes are left to compete against the growth of weeds they are promising and vigorous and six of these trees were in flower on the occasion of my visit.

Cacao Competition Plot, Castries—Of the sixteen plots worked during the two years, twelve plots were inspected during November 1921 and February 1922.

As in the lime competition plots those which were more thoroughly worked continue to show marked improvement over the others, and I am pleased to say the Prize Winners have continued to maintain good and careful work and follow the instructions that were given them during the competition. The keeping of the drain courses clear and making clean cuts while pruning as well as the gradual thining out instead of heavy pruning where the trees stand too closely, have brought about healthy good bearing well balanced trees and the Black and Brown rot of pods so prevalent during the crop season, more especially towards the close of the year have not been so much noticed.

Canker is more or less firmly established in many of the plots visited and practically no attention is given to this disease.

Manure was applied to two of the plots earlier in the year (1921) and the trees so treated were producing good crops.

Cacao Competition plots, Soufriere—Of the thirty six plots worked during the two years, thirty plots have been inspected. In this district the only two growers who have maintained the high standard of cultivation and sanitation are Messrs. Reynald Hyacinth and Joseph Etienne of Malgretoute. The mulching, pruning manuring and regulating shade trees deserve special mention. The other plots although more or less distinguishable from the remainder of the plantations so far as health and laying out of drains, &c., are concerned, are fast reverting to the conditions that previously existed.

In the Fond St. Jacques centre, Root disease is very persistent and in many instances where diseased areas were treated by digging out the dead and dying trees and isolating such areas by a trench with a negative result owing to the difficulty caused by heavy boulders on the surface as well as in the soil, the practice just now is to get out as much of the diseased wood as possible and burn them, and then plant up these areas with provision crop of yams, tannais, plantains and bananas. Needless to say the disease continue, to spread and kill the cacao surrounding such areas.

The cacao crop of last season was poor and generally speaking very little cultural attention was given to their plots by the majority of small Peasants.

Coconut Competition Plots, Castries—The six plots planted in 1919-20 are now well established and the plants are thriving excellently. In four of the plots the plants are quite regular but in the remaining two plots vacancies occur which have not been refilled.

The interplanting with provision crops and canes continue and the plants are quite free from disease.

Mulching the trees has been discontinued and so also the regular weeding of the plots. The young trees however, have taken a firm grip of the soil and where conditions are very favourable some of these young trees are now 14 ft. high.

VISITS TO ESTATES AND SMALL HOLDINGS.

Frequent visits to estates and small holdings were made by the Agricultural Officers during the year.

AGRICULTURAL CREDIT SOCIETIES.

The following covering letter from the Agricultural Superintendent to His Honour the Administrator accompanied the Report on the Agricultural Credit Societies by the Inspector of the Societies:—

I have the honour to forward the Sixth Report submitted by the Inspector on the working of the Agricultural Credit Societies for the year ended December 31, 1921.

No new members were added to these Societies and no new loans were made during the year:

The total amount owing to the Colonial Bank by these Societies at the beginning of the year was £2,348 3 10. This sum was only reduced by £271 1 9 during the year under review and is most satisfactory.

Repeated appeals and warnings to the individual societies have not been heeded and there is no reasonable excuse why greater efforts should not have been made by the individual members.

I recommend that the necessary steps should now be taken to recover the whole of the outstanding loan against the Dennery Society and that this particular Society should be wound up. The members of this Society have never taken any interest in their Society and fail to attend any meetings called by the Secretary once they have obtained a loan.

Final warnings should now be made to all the remaining Societies

Report on the Working of Agricultural Credit Societies in St. Lucia for the year 1921.

(Submitted by Mr. R. W. Niles, Inspector.)

I have the honour to submit the following report on the Agricultural Credit Societies of this Colony for the period January 1, to December 31, 1921.

General Working of the Societies:—

The number of Societies at the close of the year was the same as at the close of the previous year viz, ten, and the number of members was 461 as against 462 in 1920.

No new Members are being added to these societies because the older members have made no proper attempts to repay their original advances, and this makes it hard for New Members to get loans, and consequently there are no inducements.

At the beginning of the year the Societies owed the Colonial Bank £2,348 3 10 on December 31 they still owed £2,077 2 1. This rate of repayment was considered so unsatisfactory, that the Manager of the Colonial Bank refused to renew the loans for 1922.

DETAILED REPORT.

DENNERY: The number of members on 31-12-21 was eighty-two.

The affairs of this Society are very unsatisfactory, the majority of members will not come to attend meetings, and give a great deal of trouble, to pay their interests. The amount due the Colonial Bank at the beginning of the year was £300. On December 31, it remained the same, no attempt having been made during the year to reduce it.

MICOUD: The number of Members on 31-12-21 was fifty-eight.

The amount due the Colonial Bank at the beginning of the year was £284. This was rednced to £269 11 4 at the close of 1921. The Members still give considerable trouble, by not attending meetings regularly and keeping in touch with the working of the Society.

SOUFRIERE: The total number of Members at the close of the year was 71. The amount due the Colonial Bank at the beginning of the year was £410. This was reduced by £10 during the year leaving a balance of £400 still due by the Society at the close of the year.

CHOISEUL: The total number of Members on 31-12-21 was 37. The balance due the Colonial Bank at the beginning of the year was £280. Of this £68 7 10 was paid during the year leaving a balance of £211 12 2 still owing to the Bank at the close of the year.

LABORIE: The number of Members at the close of the year was 62. The amount due the Colonial Bank on 31-12-21 was £408 16 4. During the year £114 9 11 was paid leaving a balance of £294 6 5 at the close of the year.

VIEUX FORT: The total number of Members at the close of the year was 44. The amount due the Colonial Bank at the beginning of the year, was £192; during the year £10 was paid leaving a balance of £182 0 0 on 31-12-22.

GROS ISLET: The total number of Members on 31-12-21 was 31. During the year the Society paid in £53 15 4 to the Colonial Bank, and reduced their Loan from £119 7 6 to £65 12 2.

ANSE-LA-RAYE: The total number of Members at 31-12-21 was 41. The amount of loans due the Colonial Bank at the same date was £200, no reduction having been made during the year.

CASTRIES: The total number of Members on 31-12-21 was 21. The loan account at the same date was £154, no reduction having been made during the year.

GOOD SHEPHERD: The total number of Members on 31-12-21 was 16. No business transactions were done during the year under review.

GENERAL REMARKS.

I attended several meetings of the various Societies, both general and special, and tried to impress on the Members the necessity of paying up their advances. I also inspected the books and accounts and assisted with the clerical work of the Societies.

Agricultural instruction was given especially to Members in the various districts.

I beg to thank the Office-bearers and the various Parish Priests, for the assistance they have given in all matters pertaining to the general working of the Societies

Appended are

(A) Statement of Loan account of the various Societies.

(B) Balance Sheet of the various Societies reported on by the Public Auditor.

APPENDIX (A.)

Loan Account.

Name of Society.	Total membership.	Amount of Loans, 31-12-20.	Rate of Interest.	When Loans Repayable.	From whom obtained.	Amount paid during 1921.
		£ s. d.	Per Cent.			£ s d.
Dennery	82	300 0 0	7	31-12-21.	Col. Bank	... ...
Micoud	58	284 0 0	do.	do.	do	14 8 8
Soufriere	71	410 0 0	do.	do.	do.	10 0 0
Choiseul	38	280 0 0	do	do.	do.	68 7 10
Laborie	62	408 16 4	do.	do.	do.	114 9 11
Vieux Fort ...	44	192 0 0	do.	do.	do.	10 0 0
Gros Islet... ...	31	119 7 6	do.	do.	do.	53 15 4
Anse la Raye ...	41	200 0 0	do.	do.	do.	... ...
Castries	21	154 0 0	do.	do.	do.	... ...
Good Shepherd ...	16	... ...	...	...	...	... ...
Totals ...	461	2,348 3 10	...	...	...	271 1 9

APPENDIX (B)

Balance Sheets.

Castries Agricultural Credit Society.

Balance Sheet at 31-7-21.

	Dr.			Cr.		
	£	s.	d.	£	s.	d.
Reserve Fund				3	19	0
Loan Account				13	0	0
Working Account					14	11
In Government Savings Bank		8	4			
In hands of Treasurer	17	5	7			
	17	13	11	17	13	11

Statement of Assets and Liabilities.

	Liabilities			Assets		
Cash in Hand				17	13	11
Loans to Members				141	0	0
Reserve Fund	3	19	0			
Colonial Bank Loan	154	0	0			
Surplus Assets		14	11			
	158	13	11	158	13	11

Vieux-Fort Agricultural Society.

Balance Sheet at 31-12-21.

	Dr.			Cr.		
Working Account				£1	7	6
Reserve Fund				12	0	0
Loan Account				4	0	0
Cash in hands of Treasurer	£7	7	6			
Cash in Savings Bank Vieux-Fort	10	0	0			
	17	7	6	17	7	6

Gros Islet Agricultural Credit Society.

Balance Sheet at 23-12-21.

	Dr.			Cr.		
Reserve Fund				£8	10	0
Loan Account				9	9	1½
Working Account	£4	7	10			
Cash to Credit	13	11	3½			
	17	19	1½	17	19	1½

Anse-la-Raye Agricultural Credit Society.

Balance Sheet at 15-1-22.

	Dr.			Cr.		
Reserve Fund				£9	16	0
Loan Account				11	0	0
Working Account	£8	10	3			
Cash in hand of Treasurer		10	1½			
Cash in Colonial Bank	11	15	7½			
	20	16	0	20	16	0

Soufriere Agricultural Credit Society.

Balance Sheet at 31-1-22.

	Dr.			Cr.		
Working Account	£11	1	6			
Loan Account				£16	0	0
Reserve Fund				19	10	0
In hands of Treasurer	2	10	9			
In Colonial Bank	21	9	0			
In Savings Bank Soufriere		8	8			
	35	10	0	35	10	0

Good Shepherd Agricultural Credit Society.

Balance Sheet at 14-8-21.

	Dr.			Cr.		
Reserve Fund				£3	2	0
Working Account				3	13	8
In hands of Treasurer	£1	8	9			
In Savings Bank	5	6	11			
	6	15	8	6	15	8

Micoud Agricultural Credit Society.

Balance Sheet at 18 2-22.

	Dr			Cr.		
Loan Account				£6	18	4
Reserve Fund				18	10	0
Working Account	£4	17	7½			
Cash to Credit	20	10	8½			
	£25	8	4	25	8	4

EXTENSION OF INTEREST IN AGRICULTURAL MATTERS.

Lime Factories.

Special attention has been paid during the year to problems arising in connexion with the concentrating of lime juice, the manufacture of rum, and bay rum.

Mr. Ashby Mycologist, Imperial Deparrment of Agriculture, who rendered material assistance in this direction reported as follows:—

'The Government Factory at Castries and two factories in the Soufriere district were inspected.

'It is evident that appreciable losses of acid occur which are partly avoidable. Loss during concentration under atmospheric pressure seems unavoidable with the best care There appears to be avoidable loss (a)when the crude juice has to lie for several days (a week or more) before going to the still owing to a rush of fruit, (b) in the separation of the residual juice from the dirt which is deposited in the settling vats before concentration and after distillation. The deposit is run into special vats and resettled; this requires several days during which there is reduction of acidity. In any case the dirt finally rejected carried with it an appreciable quantity of juice. The total loss of acid at the Government Factory is rather over ten per cent., but at some private factories it may exceed thirty per cent.

'(a) The reduction of acidity in the crude juice is doubtless due to microbic action and could be prevented by adding an antiseptic. Metabisulphide and formalin were suggested and an experiment is being carried out at the Government Factory to test them.!

'(b) The hot liquor from the still might be filtered after treatment with a fixed amount of infusorial earth in the manner worked out for cane juice by Dale and Hudson

Filters with heavily tinned metal parts such as are used for vinegar and grape juice would be suitable. The feastibility of the method might be tested on a laboratory scale, with the aid of a filter pump.

'If the results proved to be promising it might be possible persuade the owners of the West coast sugar factory to try a filtering experiment as they have a lime juice plant under the same roof.

'Where there is a good pressure of pipe water time and labour might be saved by filtering the oil extracted by hand with the aid of a filter pump.'

Experiments along the lines suggested by the Mycologist were conducted by the Agricultural Superintendent as follows:—

Object: To Prevent loss of acid during Storage of Raw Juice.

Thirty gallons of raw lime juice taken direct from the mill on October 22, were placed in three open wooden vats, each vat receiving ten gallons of juice.

Vat No. 1. Being 'Control' no preservative was added.

" " 2. One ounce of metabisulphite of potassium was added.

" " 3. One and a half ounces of formaline were added.

The juice which tested 13·4 ozs. citric acid at the commencement of the

experiment was tested at varying intervals up to January 10., with the following results:—

Acid. Oz. per gallon.	Vat No. 1.	Vat No. 2.	Vat No. 3.	Interval from first testing.
	13·4	13·4	13·4	
	12·8	13.9*	14·5*	3 weeks.
	8·7	10·1	11·9	7½ „
	5·8	9·5	10·2	11½ „
	1·2	5·8	6·5	16½ „

*Due to evaporation being unequal. *The juice in vat 3 was too diluted and brought back to 13·4 and an equal volume of water was added to the other vats.

At the conclusion of this experiment samples of the juice together with a quantity of scum which had formed on the surface was submitted to the Mycologist for bacterial examination. Mr. Ashby reported as follows:—

'This was an experiment started in October and stated to be in progress on November 12.

Crude juice was stored in three open vats:—

1. Control.
2. Metabisulphite of potassium added.
3. Formalin added.

Evaporation proved to be unequal owing to the different amounts of scum or blanket. The original acidity was 13·4 oz. citric acid and on November 12. The juice tested:—

(1) 12·8, (2) 13·9, (3) 14·5.

Rather than abandon the experiment then I suggested that it be assumed that no loss of acid had occurred in (3) and that evaporation had been approximately equal; that (3) be brought back to an acidity of 13·4 with a measured quantity of water and that 1 and 2 receive the same amount of water and the level of the liquor in each be then marked and kept to it to nullify concentration due to evaporation.

I do not know if this was done. The samples just received tested in ounces per gallon:—(1) 1·12, (2) 5·8, (3) 6·5.

It is evident that the control had lost nearly all its acid and that the antiseptics had not prevented serious loss during a storage of several months. When Mr. Brooks' submits data of tests made at intervals it will doubtless be seen that the antiseptics did delay or prevent loss of acid for a considerable period, but that as they evaporated or changed into an ineffective form, loss of acid started or increased rapidly. The results indicate that when it is a question of storing for a long period, fresh doses of antiseptic must be added as required. It may be that when evaporation is allowed to proceed, the antiseptic added at the start may delay loss of acid long enough for the increased acidity due to concentration to act itself as a sufficient protection against loss of acid. This seems to be borne out by the experiments of G. A. Jones in Dominica (*Agricultural News* 11 p. 180) in which juices of high acidity kept much better than juices of low initial acidity.

'A microscopic examination of the three samples showed abundant bacteria, especially in No. 1, and also many yeast cells, mostly dead in No. 1. But many alive in 2 and 3. Fungi were not found in 1 and 2 but spores of *Aspergillus niger* (the common black mould) were numerous in (3) suggesting that patches of this mould had developed on the blanket.'

Experiment in Filtration of hot Lime Juice.

Object: to reduce labour and time now employed in subsiding lime juice previous to concentrating and to reduce sediment in the concentrated juice.

A quantity of hot lime juice was taken from the still after distillation. Infusorial earth was then thoroughly mixed with the juice at the rate of 1 oz. to the gallon of liquid. There was a loss of 0·2 oz of acid due to the infusorial earth which was of Barbados origin containing carbonate of lime.

The hot juice was then filtered by means of a glass filter pump attached to a water tap at ordinary household pressure. This small filter worked well and the filtered juice was very clear and of a bright rich amber colour.

In submitting the results of these experiments to the Imperial Commissioner of Agriculture, Sir Francis Watts made the following useful observations:—

'The experiments with regard to filtering lime juice referred to in your letter No. Ag. X. 1440, of November 11, 1921, and previous correspondence are interesting, and I offer the following comments.

'It is useful to know that the juice can be readily filtered when treated with infusorial earth. Filtration in this way would make it possible to do away with the process of subsiding and washing the residue. This would save time and space It remains to be seen whether it will prove economical to do this in small factories

'To do it would require the use of a filter press. It is probable that an ordinary iron filter press, such as is used in sugar factories, might not be entirely suitable on account of the action of the acid on the iron. It would be possible to get presses having the working parts tinned. If you wish to try experiments on a large scale there would be little objection to using an ordinary sugar factory filter press for a short time and for experimental purposes. It would have to be thoroughly washed after use to free it from acid.

'I do not see that the removal of traces of sediment, beyond what is now removed in the ordinary process of settling, will enable juice to be concentrated to a higher point without loss of acid.

'You are aware that concentrated juice may be sold either to makers of citric acid or to calico printers and others who are able to make direct use of it. In the latter case freedom from sediment is an advantage.

'I think it will be found that, even if perfectly clear juice is used for concentration, the concentrated juice will contain a small amount of sediment, due to the action of heat on some of the constituents of the juice.

'In the experiment you report the loss of acid due to the presence of calcium carbonate in the infusorial earth was about 1·6 per cent; this is not inconsiderable. It would be necessary to use infusorial earth containing as little carbonate as possible, otherwise there might be great loss.

'The use of infusorial earth might be considered for preparing clear juice for drinking purposes: probably it is so used.

'Mr. Ashby is giving attention to the ferments which decompose citric acid in lime juice. In an ordinary way lime juice keeps well for some time if it is prepared from sound fruit and the essential oil from the skins remains in the juice. The layer of scum, which contains most of the essential oil, forms a useful protecting layer and juice from sound fruit can be kept with this covering for sometime without loss. When unsound fruit is crushed, changes often set in with great rapidity. It is desirable, therefore, to boil off the juice from unsound fruit without delay, if any such has to be dealt with.'

Rum Distilleries.

After paying visits to the Cul-de-Sac and Vieuxfort distilleries. Mr. Ashby reported as follows :—

'Two sugar factories, one on the west coast and the other on the south coast were visited for the purpose of inspecting the distillery equipment. At the west coast factory the still consists of two round bodies, each of 1500 gallons capacity. The first is charged with the wash, while the second is charged with the whole of the runnings after the rum has been collected. It is surmounted by a short rectifying column and the distillate is condensed in a vertical tube condenser. A rum of about 45 o.p. is desired and to ensure this strength it has been necessary to ferment a wash set up at 12 Beaumé, a wash of 10 Be. not yielding a rum of the required strength. The fermenting vats are of 350-400 gallons capacity. The distillery was not operating and no record of individual settings, period of fermentation and attenuation appears to be kept. With such high settings the fermentation must be slow or, if rapid, very hot and the conversion of the sugar frequently incomplete. The conditions seem to promote waste and determinations of the sugar in the dead washes would be helpful. A new still of about 2000 gallons capacity is about to be erected and will doubtless be worked in conjunction with the present low wines retort and rectifier. To what use the old still will be put is not clear. The flavour of the rum is not considered satisfactory (a sample was not available) and this may be due in part to faulty fermentation and in part to faulty water. Hitherto river water has been used in the washes, but it is now proposed to use water collected from the roof of the factory. No means appear to be adopted for clarifying this water when necessary

Manufacture of Bay Rum.

'At the other factory an attempt is to be made to improve the quality of the rum. A steam still of about 750 gallons capacity with two retorts and a worm and tank condenser has been erected. It is a duplicate of the pattern of still employed in Jamaica. I pointed out that the still alone is only one, and not the most important, factor in the production of a better rum and also that the inefficient worm and tank condenser has now been abandoned by a number of distilleries in Jamaica and replaced by efficient tube condensers with water circulation which enables the temperature of the runnings to be properly controlled. The hottest part of the factory had been selected for the fermentation and the vats had been placed right up under the iron roof to allow of the washes running by gravity into the still. It was pointed out that no satisfactory fermentation could be expected under such conditions, and that the vats must be brought down even if it involved pumping the wash to the still. Advice was given in regard to the composition and density of the washes, and it is hoped, if these directions are followed out, that the quality of the rum may be improved.'

Numerous experiments were conducted by the Agricultural Department during the year to obtain a suitable formula for the manufacture of bay rum on a commercial scale.

Several samples prepared by this Department were submitted to a local firm interested in this subject and a working formula has been obtained. Local y manufactured bay rum is now being placed on the market for the first time.

This is purely a local industry, the bay oil being distilled from the wild bay trees growing throughout the island and the rum being manufactured at the local sugar factories.

PROTOZOOLOGICAL EXAMINATION OF SOILS.

Three samples of typical St. Lucia soils were submitted to Sir E. J. Russell Director of the Rothamstead Experiment Station, England, for examination with regard to the species of protozoa present in them.

The samples were obtained from the Cul-de-Sac valley, Union cacao plots and from the Agricultural Experiment Station, Reunion.

The examination was done by Mr. Harold Sandon who reported as follows:—

'I have completed the protozoological examination of the soils you kindly sent to Sir E. J. Russell in April.

'The three samples you sent show very different results. The soil from the Cul-de-Sac sugar plantation is very rich in species of all the different groups of Protozoa (Flagellates, Amoebae and Ciliates). The cacao soil from Union on the other hand is exceptionally poor, especially in Flagellates of which I could find only a single species. The third sample from the Government Experiment Station at Reunion shows an average population, (5 spp of Flagellates, 3 of Amoebae anp 2 of Ciliates). At present I can offer no explanation as to the cause of these differences, but I hope further work on various soil samples that I am getting from several countries may throw some light on it. I think possibly soil acidity may have a considerable influence on the microscopic population.

'Unfortunately owing to the changes which take place during transit it is impossible to obtain any fair idea of the actual number of individuals of each species present.'

GOVERNMENT LIME JUICE FACTORY.

Crop 1921.

The crop handled was 3248½ barrels of limes and 16,960 gallons of juice.

Compared with last year this shows a decrease of 812 barrels of limes and 12 421 gallons of raw juice.

This is chiefly due to the number of concentrating plants at present operating in the Colony, and not so much to the falling off on the part of the peasants in supplying limes to the factory. Again, the crop on the whole was late and short.

The following steam concentrating factories are now operating in the Colony —

Marquis, Corinth, Canaries, Cul-de-Sac, Invergoil, Vanard, Soufriere Estate, La Perle, Park, Troumassee and Fond. In addition there are a number of smaller plants operating at Grand Anse, Ravine Poisson; Venus; Beausejour; Balembouche and Bosquet d'Or.

The number of people who sold produce to the factory during 1921 was 574, this being 218 less than during the previous year.

This decrease is partly accounted for by the number of planters who are extending their activities and are buying from the peasants in the neighbourhood. Also by the new system recently adopted of only issuing one pass book to a house as the vendors becomes better known to the Clerk of the Factory.

Expenditure Crop 1921.

Labour	£ 236	2	5
Fuel and Oil	211	10	2
Contingencies	26	4	10
Packages	61	1	11
Export and sale of Produce...	33	0	3
Insurance	12	12	0
	£ 580	11	7
Purchase of Produce ...	566	3	6
	£1,146	15	1

Produce Shipped.

Eighty casks of concentrated juice and fourteen cases of distilled lime oil were shipped during the year. The European market has been very depressed throughout the year and sales, when possible to make, have been at prices ranging between £23 and £25 per pipe for concentrated juice and 2/2 per lb. for distilled oil.

The local prices paid at the Government Factory for produce fluctuated between 2/6 per barrel for limes at the beginning of the year to 1/6 per barrel in November.

ADMINISTRATION.

Report on the Working of Reunion Estate and Land Settlement.

LAND SETTLEMENT. The whole of the one hundred and seventy acres of land comprising this Settlement has, during the year, been devoted to the production of food crops for local consumption.

Although the average price obtained for produce was much below that realised in previous years, being in the case of potatoes a drop from 8/- per sack to 4/- and a drop from 1/- to 4d. per pot for farine, the present holders experienced little or no difficulty in paying their instalments as they became due. The total amount paid to date exceeds the amount due. The actual revenue received from this source during the year under review was £99 2 3.

CHOISEUL VILLAGE EXTENSION. This extension situated on a plateau of 200 feet above sea level having a light porous soil is being freely recommended by the Medical staff as a health resort, and in this respect it is becoming quite popular.

A few attractive bungalos have been erected and suitably furnished by private enterprise. These may be rented at a reasonable rate by applying to the owners.

The proximity of the Agricultural Station renders these house lots most desirable, and it is anticipated that further extension will follow in due course.

The work recently undertaken by the Roman Catholic Vestry of Choiseul in transferring the Juveline Boy's School from the congested Village area at sea-level to this plateau is to be commended. This School now adjoins the five-acre block of land set aside by the Government as a recreation ground.

The revenue from the sale of Village lots during the year was £63. 4. 0.

CHOISEUL VILLAGE EXTENSION.

Assessed Value of Lots.

Sold.				Remaining unsold on December 31, 1921.			
Lot.	Value			Lot.	Value		
	£	s.	d.		£	s.	d.
1	21	0	0				
2	9	0	0				
3	13	0	0				
4	13	0	0				
				5	9	0	0
				6	9	0	0
				7	13	0	0
				8	13	0	0
				9	9	0	0
				10	9	0	0
11	13	0	0				
12	13	0	0				
13	9	0	0				
				14	18	0	0
15	28	0	0				
16	32	0	0				
17	9	0	0				
18	13	0	0				
				19	13	0	0
				20	9	0	0
				21	9	0	0
				22	13	0	0
				23	13	0	0
				24	9	0	0
				25	9	0	0
				26	13	0	0
				27	13	0	0
				28	9	0	0
				29	27	0	0
				30	22	0	0
				31	20	0	0
32	16	0	0				
33	14	0	0				
34	16	0	0				
				35	30	0	0
36	27	0	0				
37	84	0	0				
Total sold	£330	0	0	Total Unsold	£289	0	0

STAFF CHANGES.

The Agricultural Superintendent returned from leave and resumed his duties on March 17.

The services of Mr. A. Pilgrim, Manager Government Lime Juice Factory were dispensed with on September 27.

Mr. R. W. Niles, Agricultural Officer, was granted sick leave on March 16 to 23, May 5 to July 6, and October 25 to November 14.

Mr. Mathurin George was appointed Junior Agricultural Assistant on April 15.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

During the year 1,703 communications including one hundred minute papers were dealt with from the Agricultural Superintendent's Office. One hundred and seven copies of the West Indian Bulletin were distributed free of charge to planters and others interested.

A number of books and pamphlets on agriculture and allied sciences were added to the library during the year under review.

EXPENDITURE, RECEIPTS, SALE OF PLANTS, ETC.

Expenditure.

The votes for the Agricultural Department for the year were as follows:—

Personal Emoluments	£1,095	0	0
Transport and Subsistence Allowance to Agricultural Superintendent Inspector Agricultural Credit Societies & Foreman Agricultural and Botanic Station Réunion	80	0	0
Subsistence Allowance Overseer and Agricultural Officer (fixed)	18	0	0
Subsistence Allowance Agricultural Assistant (fixed) ...	18	0	0
Forage Allowance Agricultural Superintendent	48	0	0
Forage Allowance Overseer and Agricultural Officer ...	48	0	0
Forage Allowance Agricultural Assistant	48	0	0
Improvements at Castries Botanic Gardens	25	0	0
Labour Agricultural and Botanic Station Réunion and Castries otanic Gardens...	475	0	0
Seeds, Plants, Manures &c., and plant disinfection ...	60	0	0
Miscellaneous	75	0	0
Printing Binding and Purchase of Books	35	0	0
Maintenance of Transport Animals Carts and Pedigree Pigs ...	55	0	0
Minor repairs to Buildings	15	0	0
Contingencies	20	0	0
Freight and transport of plants	15	0	0
Purchase of ox	15	0	0
	£2,145	0	0

The actual expenditure during the year under the above head was £2,063 8 9.

Receipts.

The receipts from the sale of plants, produce etc. from the Agricultural Stations, were as follows:—

Castries Gardens	£ 35	4	6
Agricultural Station, Réunion ...	261	18	0
Total Receipts... ...	£297	2	6

Official Visitors to the Stations.

His Honour the Acting Administrator; Mr. F. Hardy, Chemist, Imperial Department of Agriculture: Mr. L. H. Bailey, Ithaca, New York; Mr. S. F. Ashby Mycologist, Imperial Department of Agriculture; Mr. H. Flanagan, Auditor General, Windward Islands and Mr. A. K. Beauchamp, Inspector of Schools.

Plant and Seed Exchanges, Foreign and Local.

Contributions of seeds and plants were received from the following:—Royal Botanic Gardens, Kew; Imperial Commissioner of Agriculture, the Agricultural Departments of Ceylon, Trinidad, Grenada; and Mr. A. K. Beauchamp.

Seeds and plants were sent to the Agricultural Departments of Ceylon and Trinidad.

METEOROLOGICAL RETURNS.

The total rainfall for the year 1921 was 90·06 inches which is 2·60 inches in excess of the previous year.

The precipitation varied from 2·46 in April to 17·87 in December.

The following table shows the monthly and annual rainfall for the twenty-eight recording stations located in different parts of the island.

RAINFALL RETURNS, 1921.

Observation Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Maximum in one day and date.		No. of days on which rain fell.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.		
Bonneterre Est., Gros-Islet..	2·04	1·14	1·35	·53	·59	3·29	10·35	5·58	3·97	8·78	3·99	11·05	52·66	5·00	July 11th	97
Corinth ,, Castries ...	4·48	3·34	4·11	2·04	3·81	6·80	12·50	7·22	6·46	10·52	7·29	17·64	86·21	5·96	Dec. 24th	205
Marquis ,, ,, ...	3·96	2·40	2·72	1·53	3·32	6·70	11·25	7·35	7·52	10·89	6·02	16·72	80·38	4·00	,, 24th	204
Botanic Gardens ,, ...	4·89	4 14	4·57	2·46	3·93	7·33	11·83	9·36	7·77	10·12	5·79	17·87	90·06	4·62	,, 24th	275
The Barracks, Vigie, ,, ...	3·79	2·97	3·32	1·98	3·06	5·98	9·83	8·42	6·61	8·96	4·52	15·52	74·96	3·70	,, 24th	228
Government House ,, ...	3·57	2·98	3·68	2·02	2·75	7·03	7·16	7·44	5·29	7·14	4·80	13 22	67·08	3·00	,, 22nd	265
Factory. Cul-de Sac, ,, ...	4·90	4·57	5·29	1·79	3·77	8·61	11·65	9·06	6·69	11·92	7·04	12·68	87·87	2·48	,, 22 & 24	255
Crown Lands ,, ,, ...	3·94	4·29	6·83	·61	6 23	8·14	10·62	6·15	7 49	10·59	6·64	16·14	87·72	3·05	Dec. 25th	259
Belair Est., Roseau, Anse-la-[Raye ...	6·13	3·81	5·43	1·47	3·65	6·93	12·55	7·54	6·86	10·06	7·83	20·60	92·36	4·60	,, 24th	288
Uplyme Estate, ,, ...	7·75	6·57	8·48	3·88	6·13	13·68	17·71	11·50	11·00	16·91	10·82	23·17	137·69	3·61	,, 24th	293
Invergoil ,, ,, ...	3·64	2·56	3·16	1·30	2·53	7·75	10·65	6·66	5·51	9·80	4·51	13·54	71·61	3·40	,, 24th	297
La Perle ,, Soufrière ...	5·65	3·61	6 07	2·56	1·51	7·64	12·40	8 15	7 12	15·67	6·96	13·87	91 21	3·25	,, 24th	241
Ruby ,, ,, ...	5·46	3·69	6·06	1·59	1·30	7·53	12·25	8·52	7·63	14·10	5·97	15·08	89·18	3·35	,, 22nd	276
La Dauphin Est., ,, ...	4·91	3·18	6·04	1·99	2·76	9·99	12 95	7·86	8·06	17·90	5·30	13·44	94·38	2·23	Oct. 27th	252
Agri. & Bot. Sta, Choiseul..	2·00	·97	2·62	·69	1·30	5·76	7·66	5·01	6 11	11·79	4·95	11·42	60·28	3·48	,, 1st	187
Riviere Doree ,, ...	3·02	1·61	2·56	·98	1·68	6·33	8·22	5·73	5·24	11·66	4·41	10·70	62·14	2·14	,, 2nd	190
Park Estate ,, ..	2·34	3·78	7·43	2·36	3·28	8 82	10·30	7·78	7·90	15·80	7·58	16·50	93·87	3·96	Dec. 24th	242
Woodlands Estate ,, ...	6·96	3·39	8·03	3·47	4·11	9·01	13·11	8·96	9 39	14·76	8·50	20·33	110·02	5·50	,, 24th	307
Londonderry ,, Laborie .	4·09	2·15	5·59	1·81	3 14	7 04	10·62	6·88	6 45	13·01	5· 0	14·00	80·18	3 76	Oct. 1st	282
Black Bay ,, ,, ...	3·04	·25	2·15	·65	1·16	4·28	6·45	4·30	2 95	11·21	3·92	10·85	51·21	3·00	Dec. 24th	129
Retraite Est., Vieux Fort...	3·48	1·39	1·96	·9	2·48	5·67	7·27	4 77	6·17	11·06	4·20	13 49	62 93	4·05	,, 23rd	155
Moule à Chique ,, ...	1·28	·52	·84	·34	1·43	4·70	4·45	3 67	5·23	9 29	2·68	8·46	42 89	2·75	,, 23rd	144
Beausejour Estate, ,, ..	2·60	·87	1·78	·50	2·03	4·69	6·93	3·46	5·85	9·35	2·75	10·36	51·17	3·06	,, 23rd	155
Pointe Sable ,, ,, ...	2·71	1·26	2·80	·75	2·75	6·12	8·66	3·65	6 77	13·85	3 60	12 00	64·92	4 46	Oct. 13th	206
Troumassée ,, Micoud ...	1·17	1·25	1·82	No rain	1·87	3·48	9·22	2·93	6·07	8·63	2·82	15·32	54·58	3 80	Dec. 24th	73
Mamiku ,, Dennery..	3·12	1·41	2 70	·57	5·53	4·13	9·20	4 73	5·10	8·75	6·67	16·08	67·99	5·22	,, 23rd	273
Errard ,, ,, ...	4·46	5·16	3.90	·83	5·29	6 54	12·46	6·83	7·57	11·90	8·78	20 16	93 68	9·40	,, 24th	275
La Caye ,, ,, ...	2·61	2·23	2 60	·69	No rain	4·89	7·80	5·70	6 17	9·39	4·89	13·97	60 94	3·30	,, 24th	131

Publications on Sale

OF THE IMPERIAL DEPARTMENT OF AGRICULTURE

FOR THE WEST INDIES.

The 'WEST INDIAN BULLETIN' A Quarterly Scientific Journal.

Volume I:—Full reports of the Agricultural Conference of 1899 and 1900.
Only a very limited number of copies of the parts of Volume I are available, and these cannot be sold separately. Volume I complete in original paper covers as issued, post free, 5*s*.
Volume II, III, IV, V, VI, and VII:—Price 2*s*. each. Post free 2*s*. 8*d*.
Volume VIII, Nos. 1. 2. and 3:—West Indian Agricultural Conference, 1907; Abstract of Proceedings and Reprints of Papers. No. 4:—Agricultural Conference, 1908; Presidential Address and Abstract of Proceedings. Price 6*d*. each number. Post free, 8*d*.
Volume IX, Nos. 1, 2, 3, and 4:—Reprints of papers read at Agricultural Conference 1908, with summaries of discussions following. Price 6*d*, each number. Post free, 8*d*.
Volume X, Nos. 1, 2, 3, and 4:—Papers on General Subjects. Antigua Agricultural Conference.
Volume XI, Nos. 1, 2, 3, and 4:—Papers on General Subjects. Account of Imperial Department of Agriculture in the West Indies.
Volume XII. Nos. 1, 2, 3, and 4:—Papers on the Agricultural Conference, 1912.
Volume XIII, No. 1.—Containing Papers on COTTON and AGRICULTURAL EDUCATION, prepared for the recent Agricultural Conferenee.
Volume XIII, No. 2.—Containing Papers on SUGAR-CANE EXPERIMENTS IN BRITISH GUIANA, prepared for the recent Agricultural Conference.
Volume XIII No. 3.—Containing Papers on RUBBER and MISCELLANEOUS SUBJECTS, prepared for the recent Agricultural Conference.
Volume XIII, No. 4.—Containing Papers on FORESTRY, SUGAR-CANE. CTTON, LIMES, ETC.
Volume XIV, No. 1.—Containing Papers on PEASANT AGRICULTURE IN THE WEST INDIES.
Volume XIV, No. 2.—Containing Papers on CHEMISTRY, VETERINARY SCIENCE, ETC.
Volume XIV, No. 3.—Containing Papers on VETERINARY SCIENE, AGRICULTURAL EDUCATION, ANALYTICAL METHODS, and PESTS AND DISEASES.
Volume XIV, No. 4.—Containing Papers on WEST INDIAN INDUSTRIES, WATER-SUPPLY, and PLANT DISEASE.
Volume XV, Nos. 1. 2. and 3.—Containing Papers on General Subjects.
Volume XV, No. 4.—Containing an account of the Proceedings of the West Indian Cotton Conference, 1916.
Volume XVI, Nos. 1, 2, 3, and 4 — Containing Papers on General Subjects.
Volume XVII, Nos. 1, 2, 3, and 4.—Containing Papers on General Subjects, especially cotton.
Volume XVIII Nos. 1, 2, 3 and 4.—Containing Tropical Agricultural College Committee's Report, and Papers on Miscellaneous Subjects.

PAMPHLET SERIES.

The following list gives particulars of the chief pamphlets issued by the Imperial Department of Agriculture that are still available:—

SUGAR INDUSTRY.

Seedling and other Canes at Barbados, 1900-4.
Seedling Canes and Manurial Experiments at Barbados,
in 1903-5, No. 40, in 1904-6, No. 44,
in 1905-7, No. 49, in 1906-8, No. 59,
in 1907-9, No. 62, in 1908-10 No. 66, } price 6*d*. each.
Seedling and other Canes in the Leeward Islands,
in 1900-1, No. 12, in 1901-2, No. 20, } price 2*d*. each.
in 1902-3, No. 27,
in 1903-4, No. 33, in 1904-5, No. 39,
in 1905-6, No. 46, in 1906-7, No. 50, } price 4*d*. each.
in 1907-8, No. 56,
in 1908-9, No. 63, in 1909-10, No. 67—price 6*d*. each.
Manurial Experiments with Sugar-cane in the Leeward Islands,
in 1902-3, No. 30, in 1903-4, No. 36,
in 1904-5, No. 42, in 1905-6, No. 47,
in 1906-7, No. 51, in 1907-8, No. 57, } price 4*d*. each.
in 1908-9, No. 64, in 1909-10, No. 68,
Sugar-cane Experiments in the Leeward Islands,
in 1910-11, price 1*s*.; in 1911-12, price 1*s*.

SCALE INSECTS.

Scale Insects of the Lesser Antilles, Part I, No. 7, price 4*d*.
Part II, No. 22, price 4*d*.

GENERAL.

(43) Cotton Seed and Cotton-cake-meal on West Indian Plantations. Price 2*d*.
(52) Hints for School Gardens. Price 6*d*.
(60) Cotton Gins. How to erect and work them. Price 4*d*.
(61) The Grafting of Cacao. Price 4*d*.
(65) Hints for School Gardens. Fourth Edition. Price 4*d*.
(71) Insect Pests of the Lesser Antilles. Price 1*s*. 3*d*.
(72) Lime Cultivation in the West Indies. Price 9*d*.
(73) Root Borers and other Grubs in West Indian Soils. Price 6*d*.
(74) Cotton Cultivation in the West Indies. Price 9*d*.
(75) Insect Pests of Sugar-cane in Antigua and St. Kitts. Price 6*d*.
(76) Indian Corn. Price 4*d*.
(77) Erysipelas and Hoose. Price 2*d*.
(78) Onion Cultivation. Price 3*d*.
(79) Diseases of Lime Trees in Forest Districts. Price 3*d*.
(80) Hints to Settlers, St. Lucia. Price 6*d*.
(81) Agricultural and Economic Resources of St. Lucia. Price 3*d*.

The above will be supplied post free for an additional charge of ½*d*. for the pamphlets marked 2*d*.; 1*d*. for those marked 4*d*.; and 1½*d*. for Nos. 40, 41, 44, 45, 49, 59, 62, 63, 67, 73, 74 and 75; 2*d*. for No. 72 and 4*d*. for No. 71.

AGRICULTURAL NEWS.

The Fortnightly Illustrated Review of the Imperial Department of Agriculture for the West Indies.

The principal features of the **AGRICULTURAL NEWS** are as follows:—

Editorials on topics of current interest in the Tropics.

Notes and Comments on Miscellaneous subjects.

Articles dealing with

The Sugar Industry;
Fruit and Fruit Trees (Citrus, Cacao, Coco-nuts, etc.);
Cotton.

Special features include

Insect Notes (by the Entomologist);
Fungus Notes (by the Mycologist);
Down the Islands (Items of local interest);
Gleanings' page;
Reviews of new books and Departmental Reports
Miscellaneous Notes;
Market Reports.

All applications for copies of the Agricultural News should be addressed to the Agents, and not to the Department. A complete list of the London and Local Agents is as follows:—

London: Messrs. DULAU & Co., Ltd., 34-36, Margaret Street, Cavendish Square, London, W., 1.
WEST INDIA COMMITTEE, 15, Seething Lane, London, E.C., 3.
Canada: Mr. LEWIS W. CLEMENS, 801, Yonge Street, Toronto.
Barbados: THE ADVOCATE COMPANY, Limited, Bridgetown.
Jamaica: THE EDUCATIONAL SUPPLY COMPANY, 16, King St., Kingston
British Guiana: THE ARGOSY CO., LTD., Georgetown.
British Honduras: Mr. PERCY GEORGE, 'Clarion Office', Belize.
Trinidad: Messrs. MUIR, MARSHALL & Co., Port-of-Spain.
Tobago: Mr. C. L. PLAGEMANN, Scarborough.
Grenada: Messrs. THOS. LAWLOR & Co., St. George.
St. Vincent: Mr. FLORIS SIMMONS, Experiment Station.
St. Lucia: Mr. R. W. NILES, Botanic Station.
Dominica: Mr. W. G. HUTTON, Botanic Garden.
Montserrat: Mr. W. ROBSON, Botanic Station.
Antigua: Mr. J. ANJO, St. John's.
St. Kitts: THE BIBLE AND BOOK SUPPLY AGENCY, Basseterre
Nevis: Mr. W. I. HOWELL, Experiment Station.
Bahamas: Mr. N. D. SANDS, Board of Agriculture, Nassau.

The price of the *Agricultural News* is 1*d.* per number, post free, 1½*d.* Annual subscription payable to the agents, 2*s.* 2*d.*, post free, 3*s.* 3*d.* per annum. Subscription abroad 4*s.* 4*d.*; in Great Britain 5*s.* 5*d.* Volumes VIII to XIX complete, with title page and index, as issued—Price 4*s.* each, post free 5*s.* Only a few copies available. The scale of charges for ADVERTISEMENTS may be obtained on application to the agents as above.

Advocate Co., Ltd.—Printers.